SUBJECT INDEX

A

ABC transporter, 612
Acetoxymethyl ester derivatives
  incorporation of caged compounds into cells and, 775
Acetylcholine
  calcium currents in cardiac tissue and, 465
  calcium gradients and, 444
  cardiac ion channels and, 465–66
Acetylcholine receptor
  nicotinic
    Bis-Q and, 760–61
    carbamoylcholine and, 761
Acid-base balance
  renal H-K-ATPase and, 335–36
Acid-base perturbation
  renal intercalated cells and, 274–77
Acidosis
  renal intercalated cells and, 275–77
Acoustic cortex
  response synchronization in, 360
Acromegaly
  nephromegaly and, 309
ACTH
  aldosterone synthesis and, 118–19
Actin
  isoforms of
    alternative pre-mRNA splicing and, 60
  photoactivation of fluorescence and, 764–65
  wound healing and, 806
Actinomycin D
  synaptic potential and, 413
Action potential
  cardiac
    ionic permeability and, 4–6
    potassium and, 7
    voltage clamping and, 6–7
  propagating
    upstroke velocity and, 6–7
Activator protein-1
  circadian entrainment and, 746
  constituents of, 57
  regulation of
    light and, 743–44
Activin, 307
Acute respiratory distress syndrome
  eosinophil accumulation in alveolar airspace in, 244
Adams, S. R., 755–78
Adenine nucleotide-binding cassette transporter, 612
Adeno-associated virus
  cell transfection and, 193
Adenosine triphosphate
  cystic fibrosis transmembrane conductance regulator and, 617–18
Adenoviruses
  cell transfection and, 193
  viral promoters of
    fusion gene expression and, 185
Adenylate cyclase
  cardiac hypertrophy and, 65
  cholera toxin activation of, 635–36
  isoforms of
    mechanoresponsiveness of, 68
  renal H-K-ATPase and, 335
  serotonin entrainment pathway and, 735
Adenylyl cyclase
  cardiac ion channels and, 465–66
  cardiac pacemaker and, 462–63
Adherence glycoproteins
  pulmonary circulation and, 241
Adherence proteins
  neutrophil marginated pool and, 232–35
  neutrophil-mediated endothelial cell injury and, 239–42
Adipocytes
  glucose transporter in, 598
Adipose cells
  glucose transporter-1 mRNA in, 594
Adipose tissue
  glucose transporter in, 597
Adrenal glomerulosa cells
  calcium oscillations in, 430
β-Adrenergic agonists
  renal intercalated cells and, 273–74
Aequorin
  calcium oscillations and, 431–32
Aerobic performance
  body size and, 555–57
  circulatory convection and, 559–61
  limitations to, 555–64
  mitochondrial oxidative capacity and, 557–58
  peripheral diffusion and, 559
  pulmonary gas exchange and, 561–62
  pulmonary ventilation and, 562–63
  symmorphosis and, 563–64
Aerobic power, 554
African violet
  growth of
    light cycles and, 32
  photoperiodic induction in, 42
Air embolization
  pulmonary endothelial cells and, 238
Airway epithelial cells
  transfection of, 183
Airway inflammation
  eosinophils and, 244
Albertine, K. H., 227–45
Aldosterone, 115–27
  atrial natriuretic factor and, 103
  biosynthesis of
    regulation of, 118–20
    11β-hydroxysteroid dehydrogenase and, 121–25
    intracerebroventricular infusion of
      effects of, 117
    mineralocorticoid receptor and, 120–21
    renal H-K-ATPase and, 336
    renal intercalated cells and, 277–78

Alkali metal cations
gramicidin channel and, 473
Alkalosis
renal intercalated cells and, 276–77
Alpha-naphthyl thiourea
increased permeability pulmonary edema and, 217
Alveolar capillary bed
neutrophil margination in, 230
Alveolar flooding
mechanisms of, 157–58
Alveolar liquid layer
mechanical stability of, 164–65
Alveolar liquid pressure, 162–64
Alveolar liquid space compliance, 169–70
Alveolar liquid space interstitial resistance, 167
Alveolar space
flow of liquid to pleural space from, 220–21
Alveolar type II cells
surfactant protein-C gene expression in, 183
transfection of, 183
Alveolar ventilation
body size and, 562
Alveolar wall interstitial compliance, 168–69
Alveolar wall interstitial fluid pressure, 161–62
Alveolar wall interstitial resistance, 167
Amiloride
c-fos gene expression and, 63, 66
ion exchange in renal intercalated cells and, 271
Amines
photoremovable protecting groups for, 758
Amino acid analysis
sodium/glucose cotransporter and, 578
Amino acid metabolism
circadian clock mutants and, 706
Amino acids
caged, 760–62
Ammonium
gramicidin channel and, 473
Amniotic fluid
insulin-like growth factor binding protein-1 in, 139
AMPA receptor
aniracetam and, 384
glutamate-induced depolarization and, 381–82
long-term enhancement and, 382–83
Anaerobic glycolysis
metabolic power and, 554
Anaerobic power
measurement of, 554
Anaphylatoxin
pulmonary endothelial cells and, 238
Anesthesia
delta-range oscillations in, 351
local
gramicidin-containing bilayers and, 489
Angiotensin
calcium spiking behavior and, 429
Angiotensin II
aldosterone synthesis and, 118–19
endothelin potency compared, 255
immediate early gene expression and, 67
renal homeostasis and, 249
Angiotensinogen mRNA
in heart, 67
Animal locomotion
oscillatory networks controlling, 667
Aniracetam
AMPA receptor currents and, 384
Anisomycin
serotonin entrainment pathway and, 735
synaptic potential and, 413–14
Anopheles bellator
daily activity cycle of, 23
Anopheles homunculus
daily activity cycle of, 23
Anthesis
circadian timing of, 29
Antiarrhythmics
sodium availability curve and, 6–7
AP-1
See Activator protein-1
Aplysia
nonassociative/associative learning in, 406–8
oscillator proteins in
functions of, 741–42
protein synthesis in, 740–41
Aplysia eye
circadian oscillator in, 732–37
protein components of, 739–40
photic entrainment pathway in, 733–34
Aplysia synapses
post-tetanic potentiation in, 390
Apolipoprotein metabolism
transgene expression and, 101
APV
glutamate-induced depolarization and, 381
Arabidopsis thaliana
circadian rhythm mutation in, 699
Arachidonic acid
lipocortins and, 741
long-term enhancement and, 386
Arctic ground squirrel
daily activity pacemaker of, 45–47
Arginine
long-term enhancement and, 386
Arginine vasopressin
renal homeostasis and, 249
Arthropod neuromuscular junction
long-term synaptic plasticity at, 409–10
Aschoff's Rule, 39
Aspartate
caged derivatives of, 761–62
Aspirin
renal vascular resistance and, 254
Assembly coding, 354
across cortical areas, 357–58
synchronizing connections and, 359–60
Associative learning
in *Aplysia*, 406–8
in *Hermissenda*, 408–9
Associative recall
long-term enhancement and, 377–78
Astrocytes
long-term potentiation and, 404
Atractaspis engaddensis venom
sarafotoxin isolated from, 250
Atrial natriuretic factor
cardiovascular regulation and, 103–5

gene expression in heart and, 61
immediate early genes and, 59
renal homeostasis and, 249
Atrial natriuretic factor gene expression
activation of, 87–88
Atrial natriuretic peptide
endothelin and, 254
Attention
binding by synchrony and, 355
Automated interactive microscopy, 810
Availability curve, 6–7
Avian song center
development of, 405–6
Azide
renal H-K-ATPase and, 327

B

Bafilomycin
renal intercalated cells and, 269
Bailey, C. H., 397–418
Banana meiosis
circadian timing of, 22, 29, 32
Baroreflex
atrial natriuretic factor and, 105
Bat flight muscle
capillarity of, 512–14
Bat limb muscle
capillarity of, 516–18
Baxter, G., 785–810
Benzoin esters
caged compounds and, 758
α-Benzoyl-3,5-dimethoxybenzyl phosphate
caged compounds and, 758–59
8-Benzylthio-cAMP
serotonin entrainment pathway and, 735
Beta cells
glucose uptake system of, 596
Beta-globin gene
advantages/disadvantages of, 187
eukaryotic promoter-driven fusion gene expression and, 186
Bicarbonate
reabsorption in proximal tubule
cyclic AMP and, 292
Binding problem, 353–55
Biological clock, 17–52, 665
Biological oscillations
cycle period of, 662–63
mathematical descriptions of, 670–79
phase relationships of, 663
waveform of, 663–64
Biological oscillators, 661–79
differential equations for, 672–79
physical oscillators compared, 671
qualitative descriptions of, 664–70
qualitative model for, 664
Biological timing, 17–52
Bird song
learning of, 405–6
Bis(2-nitro-4,5-dimethoxyphenyl)methyl 2-nitrobenzyl groups and, 758
Bis-Q
nicotinic acetylcholine receptor and, 760–61
Bistability phenomenon, 43
Black box analysis, 657–58
Block, G. D., 661–79
Blood clotting
transgene expression and, 101
Blood pressure
aldosterone and, 117
atrial natriuretic factor and, 103–4
transgene expression and, 101
B lymphocytes
calcium oscillations in, 430
Body size
aerobic performance and, 555–57
alveolar ventilation and, 562
Brain
glucose transporter-1 mRNA in, 594
somatotopic maps in modification of, 401
Brain-derived neurotrophic factor, 308
Brightfield microscopy, 788–89
Broaddus, V. C., 209–23
Bromeliaceae
photosynthetic process in temporal programming of, 28
8-Bromo-cGMP
photic entrainment pathway and, 733–34
Brownian dynamics
gramicidin channel and, 491
Busath, D. D., 473–93

C

Caffeine
calcium storage and, 442
Caged compounds, 755–78
amino acids, 760–62
caging groups for, 756–60
calcium chelators, 767–74
enzymes, 765–67
fluorophores, 762–65
incorporation into cells, 774–76
neurotransmitters, 760–62
peptides, 765–67
spatial control of photorelease and, 776–77
Caging groups, 756–60
Cain, B. D., 323–42
Calciosome, 441
Calcium
long-term enhancement and, 381
signal transduction pathway of plants and, 69
sodium availability curve and, 6–7
Calcium buffers
caged, 772–73
Calcium-calmodulin-dependent protein kinase II
renal brush border membrane exchanger and, 297–98
Calcium chelators
caged, 767–74
Calcium fingerprint, 431
Calcium influx pathways, 442–44
Calcium oscillations, 427–47
calcium gradients and, 444–45
generation of models for, 433–40
modulation of, 431–33
properties of, 428–31
role of, 445–47
Calcium oscillator, 668–70
differential equations for, 678–79
qualitative scheme for, 670
Calcium-phospholipid-dependent protein kinase
renal brush border membrane exchanger and, 295–97
Calcium storage, 440–42
Calmedin
calcium release and, 435

Calmodulin
calcium oscillations and, 446
signal transduction pathway of plants and, 69
Carbamoylcholine
nicotinic acetylcholine receptor and, 761
Carbenoxolone
11β-hydroxysteroid dehydrogenase and, 122
steroid metabolism and, 124
Carbohydrate digestion, 575
Carbonic anhydrase
parathyroid hormone and, 292
renal intercalated cells and, 271–72
Carboxylates
photoremovable protecting groups for, 758
Cardiac α-actin gene expression
in cardiac cells, 79
Cardiac action potential
ionic permeability and, 4–6
potassium and, 7
voltage clamping and, 6–7
Cardiac contraction cycle, 455
Cardiac development
transcriptional regulation during, 78–86
Cardiac fibrosis
aldosterone and, 117
Cardiac gene expression
mechanical stress and, 55–70
Cardiac gene regulation
mechanical stress and, 56–62
mechanisms of, 62–67
Cardiac hypertrophy
cyclic AMP and, 65
fetal isoform reexpression in, 60–62
hemodynamic overload and, 55–56
inducible gene expression during, 86–90
stretch-activated ion channels and, 65–66
Cardiac hypertrophy-related factor, 66
Cardiac ion channels
regulation of, 465–66
Cardiac muscle
glucose transporter in, 597
regulatory elements for, 80
Cardiac muscle gene expression
E-box-dependent pathways in, 78–80
E-box-independent pathways in, 81–83
Cardiac pacemaker, 455–67
generation of activity, 456–58
neurotransmitter control of, 462–65
parasympathetic modulation of, 464–65
sympathetic modulation of, 462–64
Cardiac pacemaking
background inward current and, 460–62
hyperpolarization current in, 459–60
slow inward current in, 460–62
Cardiogenesis
transcriptional regulation during, 78–86
Cardiomyocytes
hemodynamic overload and, 55–56
immediate early gene expression in mechanical stress and, 58–59
protein synthesis in protein kinase C and, 64
Cardiovascular regulation
atrial natriuretic factor and, 103–5
Cardiovascular research
transgenic mice in, 97–110
Caryophyllacae
photosynthetic process in temporal programming of, 28
Catecholamines
cardiac ion channels and, 465–66
pacemaker depolarization and, 457
sinoatrial node and, 463–64
cDNA clones
transgenic technology and, 99
cDNA sequence analysis
insulin-like growth factor binding protein-2 and, 136
Cell adhesion molecules
synaptic reorganization and, 411–13
Cell chemistry
caged compounds and, 755–78
Cell cycle
immediate early genes and, 56
insulin-like growth factor-I and, 132
Cell permeabilization
force generation in skeletal muscle and, 774
Cell transfection
liposome/ligand conjugate-mediated, 190–92
transfected DNA in intracellular fate of, 193–201
virus-based, 192–93
Cerebellum
structural plasticity in, 400–1
Chien, K. R., 77–91
Chlamydomonas
clock mutants in, 686, 698
Chloramphenicol acetyltransferase gene expression assay for, 108–9, 186
Chloramphenicol acetyltransferase reporter gene
advantages/disadvantages of, 187
Chloride channels
cystic fibrosis and, 633–34
cystic fibrosis transmembrane conductance regulator and, 614–15
in renal intercalated cells, 271
Chloride conductance
cystic fibrosis and, 181–82
cystic fibrosis transmembrane conductance regulator and, 614–15
Chloridorrhea
congenital, 643–44
Chloroquine
cell transfection efficiency and, 200
Cholera
oral rehydration therapy and, 576
Cholera toxin, 635–39
enteric nervous system and, 637–39
internalization, reduction, transport of, 637
mechanism of action of, 635–36
Chondrocytes
insulin-like growth factor mRNA expression in, 132
Choroid plexus
glucose transporters in, 603

Chromaffin cells
calcium oscillations in, 428
Chromosome 7
cystic fibrosis and, 610–11
Chromosome 22
sodium/glucose cotransporter gene on, 585
Chromosome theory of heredity, 657
Chymotrypsin
acylation of, 765
Chymotrypsin gene
CANNTG sites and, 79
Circadian clocks, 665, 683–720
in *Drosophila*, 712–20
immediate early genes and, 744–46
in mammals, 699–701
mutation and, 698–720
in *Neurospora*, 701–12
in plants, 698–99
Circadian cycle
photo-inducible phase in, 43–45
Circadian entrainment
AP-1 and, 746
Circadian organization
evolution of, 49–52
Circadian oscillations, 729–49
macromolecular synthesis and, 737–42
Circadian oscillator, 665–67
in *Aplysia* eye, 732–37
components of, 730–32
differential equations for, 674–75
protein components of, 739–40
qualitative scheme for, 666
Circadian pacemakers, 665
Circadian rhythmicity, 21–22, 657–69
genetic approaches to, 683–98
oscillators in, 32–33
photoperiodic induction and, 40–45
temperature compensation and, 25–27
Circadian surfaces, 41–42
Circular dichroism
gramicidin channel and, 478
Circulatory convection
aerobic performance and, 559–61
Clathrin
cell adhesion molecule down-regulation and, 412
Clemmons, D. R., 131–46
Clunio
developmental stages in temperature compensation and, 29
CNQX
glutamate-induced depolarization and, 381
Cohick, W. S., 131–46
Colchicine
microvillus inclusion disease and, 647
Colon
cystic fibrosis and, 620
Coma
delta-range oscillations in, 351
Compensatory hypertrophy, 305, 310–11
Confocal microscopy, 793–94
Congenital chloridorrhea, 643–44
Congenital sodium secretory diarrhea, 644–45
Connective tissue
insulin-like growth factor synthesis in, 132–33
platelet-derived growth factor and, 308
Consciousness
binding by synchrony and, 355
Continuous positive pressure ventilation
lung fluid balance and, 173
Cooperativity phenomenon, 377
Crab
melanophore expansion in daily rhythm of, 26
Crayfish neuromuscular junction
long-term synaptic plasticity at, 409–10
Creatine kinase
gene expression in heart and, 61
Cross-correlation analysis
anatomical connectivity and, 357
temporal coding and, 355
Crucifer
circadian rhythm mutation in, 699
Crustacean neuromuscular junction
long-term synaptic plasticity at, 409–10
Crypt-villus axis
ion transport along, 631–33
Cycle period
biological oscillations and, 662–63
Cyclic AMP
angiotensin II secretion and, 67
cardiac hypertrophy and, 65
cardiac ion channels and, 465–66
cardiac pacemaker and, 462–63
cholera toxin and, 638
long-term sensitization and, 407
osmoregulation and, 67–68
renal intercalated cells and, 273–74
serotonin entrainment pathway and, 735
surfactant protein-A gene and, 183
Cyclic AMP-dependent protein kinase
renal brush border membrane exchanger and, 292–95
Cyclic GMP
Escherichia coli enterotoxin and, 639
photic entrainment pathway and, 733
Cyclic nucleotides
lipocortins and, 742
serotonin entrainment pathway and, 735
Cycloheximide
circadian oscillations and, 737
microvillus inclusion disease and, 646
Cyclosporine
endothelin secretion and, 259
Cystic fibrosis, 633–35
chloride conductance and, 181–82
chromosome 7 and, 610–11
mucous glands and, 199–200
Cystic fibrosis transmembrane conductance regulator, 609–25
activity of, 619–20
adenosine triphosphate and, 617–18
chloride conductance and, 614–15
functionally competent, 622–23
mutant
localization of, 621–22
phosphorylation and, 616
primary structure of, 612–14

properties of, 612–14
purification of, 618–19
reconstitution of, 619
wild-type
localization of, 620–21
Cystic fibrosis transmembrane conductance regulator gene, 181–83
discovery of, 610–12
Cytochalasin B
glucose transport and, 592–93, 596
Cytokines
neutrophil-mediated endothelial cell injury and, 242–43
Cytomegalovirus
promoter and enhancer sequences of
fusion gene construction and, 185

D

Dawson, D. C., 571–73
Deacetylanisomycin
serotonin entrainment pathway and, 735
DeBiasio, R. L., 785–810
Dentate gyrus
long-term potentiation in, 402, 403
synaptic enhancement in, 381
Deoxycorticosterone, 115
mineralocorticoid receptor and, 124–25
Dephosphorylation
calcium oscillations and, 446
cystic fibrosis transmembrane conductance regulator and, 616
renal brush border membrane exchanger and, 292–98
Desethanolamine gramicidin A
conductance populations of, 476
Dexamethasone
insulin-like growth factors and, 139–40
Diabetes mellitus, 305, 311
Diacylglycerol
protein kinase C and, 63, 433
Diarrhea
congenital sodium secretory, 644–45
cystic fibrosis and, 633
microvillus inclusion disease and, 645
oral rehydration therapy and, 576
secretory
cystic fibrosis heterozygotes and, 634–35
Diastolic depolarization, 455–61
5,6-Dichloro-1-b-D-ribofuranosylbenzimidazole
circadian oscillations and, 739
Dielectric relaxation
gramicidin channel and, 486–87
Differential equations
biological oscillators and, 672–79
Differential interference contrast microscopy, 789
DiFrancesco, D., 455–67
Digestion
final products of, 575
Dihydropyridine
endothelin-induced renal vasoconstriction and, 255
Diltiazem
c-fos gene expression and, 63
4,5-Dimethoxy-2-nitrobenzyl 2-nitrobenzyl groups and, 756
1-(4,5-Dimethoxy-2-nitrophenyl)ethyl 2-nitrobenzyl groups and, 757
5,7-Dinitroindolinylamide
caged compounds and, 759
3,5-Dinitrophenyl
caged compounds and, 759
Diphtheria toxin gene
eukaryotic promoter-driven fusion gene expression and, 186
DM-nitrophen
caged calcium and, 767–72
DNA
transfected
intracellular fate of, 193–201
DNA synthesis
insulin-like growth factor-I and, 132
DNA topology
lung cell transfection and, 197
DNA transfer
methods of, 189–93
DNA viruses
viral promoters of
fusion gene expression and, 185
Drosophila
circadian clock in, 712–20
circadian clock genes in, 685
circadian clock mutants in, 686–98
fasciclin II in, 412
gene transcription in
clock-controlled, 51
neuronal connectivity in
cyclic AMP cascade and, 407
period gene mRNA and protein in
circadian cycling of, 748–49
phase-response curve for, 33
Drosophila auraria
circadian pacemaker of
photoperiod and latitude and, 40
diapause induction in
photoperiod and, 43–44
Drosophila melanogaster
developmental stages in
circadian control of, 29
locomotor activity of
circadian rhythm of, 34
Drosophila persimilis
daily activity cycle of, 23–24
Drosophila pseudoobscura
circadian pacemaker of
entrainment of, 36, 37
daily activity cycle of, 23–24
eclosion activity of
circadian rhythm of, 35, 47–48
Drosophila victoria
pupariation in
circadian timing of, 29
Dunlap, J. C., 683–720
Dunn, M. J., 249–59

E

Eclosion activity
circadian rhythm of, 35, 47–48
Edema
pulmonary
formation of, 156–57
hydrostatic, 213–15
increased permeability, 215–20
pleural and pulmonary
liquid and, 212–21
EDTA
c-fos gene expression and, 63

Eicosanoids
vascular/airway smooth muscle and, 244
Electrolyte transport
intestinal
congenital defects of, 641–48
Electroporation
cell transfection and, 189
Emigration
neutrophil, 228–29
Endocytosis
receptor-mediated
cholera toxin and, 637
Endometrial cells
insulin-like growth factor binding protein-1 in, 139
Endothelial cell injury
neutrophil-mediated adherence proteins and, 239–42
cytokines and, 242–43
requirements for, 235–38
Endothelial cells
calcium gradients in, 444
calcium oscillations in, 430, 437
calcium spiking behavior in, 429
neutrophil interactions in lung, 229–35
pulmonary
neutrophil margination and, 232
shear stress and, 68
Endothelial-derived relaxing factor
shear stress and, 68
Endothelin, 249–59
cardiocyte hypertrophy and, 67
glomerular filtration rate and, 249, 256–57
glomerular function and, 256–57
glomerular mesangial cells and, 257
renal function and, 249–50
renal hemodynamics and, 254–56
renal pathophysiology and, 258–59
renal vascular tone and, 254–55
secretion of, 251–52
localization of, 252–53
sites of action in kidney, 252–54
sodium balance and, 257–58
structure and molecular biology of, 250–51
water balance and, 258
Endothelin-converting enzyme
specificity of, 251–52
Endothelin receptor
identification of, 253–54
Endotoxin
neutrophil emigration into alveolar airspace and, 241
pulmonary endothelial cells and, 238
Endotoxin shock, 242
Enteric nervous system
cholera toxin and, 637–39
Enterocytes
adenylate cyclase activity of
cholera toxin and, 638–39
sugar absorption and, 576, 584
Enterotoxin
Escherichia coli, 639–41
guanylin and, 640–41
intestinal guanylate cyclase and, 633
mechanism of action of, 639
receptor, 640
Vibrio cholerae, 635–39
Entrainment, 33
in *Aplysia* eye, 733–37
photic, 733–34, 742–44
photoperiodic induction and, 43
serotonin, 734–35
Environmental complexity
synapse formation and, 399–400
Environmental periodicity, 28–29
Enzymes
caged, 765–67
Eosinophils
airway inflammation and, 244
in pulmonary circulation, 243–44
Epidermal growth factor
acute renal failure and, 312–13
compensatory renal hypertrophy and, 310
diabetes mellitus and, 311
metanephrogenesis and, 314
renal tissue and, 306–7
Epilepsy, 402
Epinephrine
sinoatrial node and, 463–64
Epiphenomena, 360–63
Epithelial cells
calcium oscillations in, 430
glucose transporters in, 598–603
Eptesicus fuscus flight muscle
capillarity of, 512–14
Erythropoiesis
transgene expression and, 101
Escherichia coli
osmoregulation in, 68
Escherichia coli enterotoxin, 639–41
guanylin and, 640–41
intestinal guanylate cyclase and, 633
mechanism of action of, 639
receptor, 640
Eskin, A., 729–49
Esophageal atresia
hydramnios and, 642
Estrogen
insulin-like growth factors and, 133
Ethchlorvynol
pleural effusion and, 217
N-Ethylmaleimide
renal intercalated cells and, 269
Euglena
circadian clock in, 51
temperature compensation and, 27
DNA replication and mitosis in
timing of, 29
Eukaryotes
circadian programming in, 49–50
Eukaryotic cells
mitotic engine in
kinases driving, 685
Evans, S. M., 77–91
Exercise
hyperventilation and, 562–63
Exocytosis
caged calciums and, 771
calcium and, 446
lipocortins and, 741
Expression cassette, 182
construction of, 185–88
Expression cloning
sodium/glucose cotransporter and, 577, 592

Extravascular lung water
vertical gradients in, 172–73

F

Factor Xa
acylation of, 765
Farkas, D. L., 785–810
Fasciclin II, 412
Fasting
insulin-like growth factors and, 141–42
Fatty acids
circadian clock mutants and, 705–6
Fetal development
insulin-like growth factors and, 142–43
Fewtrell, C., 427–47
Fibroblast growth factor
cardiac hypertrophy and, 66
insulin-like growth factor-I and, 132
metanephrogenesis and, 314
renal tissue and, 308
Fibroblasts
calcium oscillations in caged calciums and, 771
glucose transporter-1 mRNA in, 594–95
insulin-like growth factor-I activity in, 138
insulin-like growth factor mRNA expression in, 132
wound healing and, 805–6
Field, L. J., 97–110
Field, M., 631–49
Filarial parasites
innate daily program of, 28
Fluid secretion
intestinal, 631–33
Fluorescence anisotropy, 792
Fluorescence depolarization
gramicidin channel and, 487–88
Fluorescence microscopy, 788, 789–93
three-dimensional, 793–94
Fluorescence ratio imaging microscopy, 790–93
Fluorescence recovery after photobleaching, 762–65, 793
Fluorescence resonant energy transfer, 763
Fluorophores
caged, 762–65
Formamidinium
gramicidin channel and, 473
Friesen, W. O., 661–79
Frontal cortex
response synchronization in, 360
Fructose absorption, 575–76
Fructose transport
glucose transporter-2 and, 596
Funder, J. W., 115–27
Fura-2
calcium oscillations and, 431–32
Furosemide
potassium secretion and, 326
Fusion gene
construction of, 185–88
Fusion gene expression, 183

G

Gadolinium
c-fos gene expression and, 63, 66
Galactose
absorption of, 576
Galactose transport
glucose transporter-2 and, 596
β-Galactosidase gene
advantages/disadvantages of, 187
expression assay for, 108–9, 186
Gall bladder
Escherichia coli enterotoxin receptor in, 639
Gallus domesticus
passive avoidance learning in, 404–5
Gamma-aminobutyric acid
caged derivatives of, 761–62
Gastric chief cells
calcium spiking behavior in, 429
Gastric H-K-ATPase, 341–42
Gastrointestinal transport
molecular basis of, 571–73
Gee, M. H., 227–45
Gene expression
altered
long-term memory and, 413–15
cardiac
mechanical stress and, 55–70
shear stress and, 68
Genetic mapping
endothelin and, 250–51
Gene transcription
immediate early genes and, 56
Gene transfection
lung cells and, 181–201
Gene transfer therapy
lung disorders and, 194–95
Genomic blotting
endothelin and, 250
Genomic clones
transgenic technology and, 99
Glial fibrillary acidic protein
long-term potentiation and, 404
Glomerular filtration rate
diabetes mellitus and, 311
endothelin and, 249, 256–57
growth hormone and, 310
insulin-like growth factor-I and, 309
Glomerular mesangial cells
endothelin and, 257
insulin-like growth factor-I and, 306
Glomerulonephritis
growth factor-induced, 313–14
Glomerulosclerosis
growth factor-induced, 313–14
Glucocorticoid receptor, 115–16, 120
Glucocorticoid response element, 117
Glucocorticoids
surfactant protein-A gene and, 183
transepithelial sodium flux and, 125–26
Gluconeogenesis
insulin-like growth factor-I and, 309
Glucose
absorption of, 576
Glucose-galactose malabsorption, 576–77, 585–86
Glucose transporter, 591–604
epithelial cell, 598–603
facilitated diffusion, 592–98
human erythrocyte, 592–95
Glucose transporter-1, 592–95
in kidney absorptive epithelial cells, 602–3
orientation in membranes, 593

Glucose transporter-2, 595–97
in intestinal absorptive epithelial cells, 598–99
in kidney absorptive epithelial cells, 602
Glucose transporter-3, 597
Glucose transporter-4, 597
Glucose transporter-5, 598
in intestinal absorptive epithelial cells, 599–602
in kidney absorptive epithelial cells, 603
Glutamate
caged derivatives of, 761–62
synaptic release of
long-term enhancement and, 379–80
Glutamate receptor
NMDA-selective class of
long-term enhancement and, 377
Glyceraldehyde-3-phosphate dehydrogenase
renal intercalated cells and, 272
Glycine
caged derivatives of, 761–62
Glycogen phosphorylase
anaerobic power and, 554
Glycolysis
anaerobic
metabolic power and, 554
Glycoproteins
adherence
in pulmonary circulation, 241
Glycosylation
sodium/glucose cotransporter and, 577–78
Glycyrrhetinic acid
steroid metabolism and, 124
water-soluble hemisuccinate of, 122
Golgi-endoplasmic reticulum-lysosome system
cholera toxin and, 637
Gonyaulax
circadian rhythms of, 48
temperature compensation and, 27
Gough, A., 785–810
G-proteins
cardiac ion channels and, 465–66
insulin-like growth factor-II receptor and, 145–46
intestinal brush border
cholera toxin activation of, 636
Gramicidin channel, 473–93
backbone dihedrals of, 482–83
circular dichroism and, 478
dielectric relaxation and, 486–87
entry/exit rate constants for, 481–82
fluorescence, energy transfer, surface potential of, 477–78
fluorescence depolarization and, 487–88
high-performance liquid chromatography and, 479
infrared spectroscopy and, 483–86
ion-binding affinity of, 481–82
ion-binding site in, 480
laser Doppler velocimetry and, 486–87
models for, 474–75
kinetic, 491–92
molecular energy calculations and, 489–91
mutations and, 475–77
noise and current fluctuations in, 477
normal modes analysis and, 483–86
nuclear magnetic resonance and, 479–83
peptide aggregation and, 489
photolysis and, 488–89
radiolysis and, 488–89
scanning tunneling microscopy and, 487
single-stranded β-helix and, 474–75
structure of, 482
X-ray crystallography and, 483
X-ray diffraction and, 480, 486
Granulosa cells
insulin-like growth factor-I mRNA expression in, 133
Green plants
photoperiodic responses of phytochrome and, 41
photosynthetic activity of daily rhythms of, 28
Growth factors
acute renal failure and, 312–13
chronic renal failure and, 312
maladaptive effects in kidney, 313–14
metanephrogenic process and, 314
Wilms' tumor and, 314–15
Growth hormone
chronic renal failure and, 312
compensatory renal hypertrophy and, 311
glomerulosclerosis and, 313
hypersomatotropism and, 309–10
insulin-like growth factor mRNA and, 132–33
insulin-like growth factors and, 139–40
Growth hormone gene
advantages/disadvantages of, 187
Guanylate cyclase
Escherichia coli enterotoxin and, 639
intestinal
Escherichia coli enterotoxin and, 633
Guanylin
Escherichia coli enterotoxin and, 640–41

H

Habituation, 406
Hair cells
ion channels in, 68–69
Hammerman, M. R., 305–15
Hazinski, T. A., 181–201
Heart
capillarity of, 519–20
development of
transcriptional regulation during, 78–86
glucose transporter-1 mRNA in, 594
immediate early genes in, 58–59, 87–88
load-response genes in, 59–60
Heart rate
vagal stimulation and, 464
Heat shock proteins
c-myc transcription factor and, 57
Helix-loop-helix proteins
cardiac development and, 80
Hemoglobin
long-term enhancement and, 387–88

Hepatocyte growth factor
compensatory renal hypertrophy and, 311
renal tissue and, 309
Hepatocytes
calcium fingerprint in, 431
calcium gradients in, 444
calcium oscillations in, 437
calcium spiking behavior in, 428–30
facilitated diffusion glucose transporter in, 596
Hepatoma cells
insulin-like growth factor binding protein-1 in, 139
Heredity
chromosome theory of, 657
Hermissenda
associative learning in, 408–9
Herpes simplex thymidine kinase promoter
promoter and enhancer sequences of
fusion gene construction and, 185
Heterologous sequences
transgenic technology and, 99–100
Hexamethonium
cholera toxin secretory effect and, 638
Hexokinase I
renal intercalated cells and, 272
High-performance liquid chromatography
gramicidin channel and, 479
Hill equation, 527–28, 530, 539
Hippocampal synapses
long-term enhancement of, 375–91
Hippocampus
cortical networks in simulations of, 353
kindling in, 402–4
long-term potentiation in, 401–4
synaptic transmission in homosynaptic potentiation of, 366
Hocker, C. G., 661–79
Homing pigeon
sun-compass behavior of, 32
Homologous sequences
transgenic technology and, 99–100
Honeybee
time-memory in, 27, 29
Hormones
insulin-like growth factors and, 139–40
House sparrow
circadian pacemaker of, 47
Human erythrocyte glucose transporter, 592–95
Hummingbird flight muscle
capillarity of, 510–12
Hydramnios
esophageal atresia and, 642
Hydrazine
gramicidin channel and, 473
Hydrochloric acid
neutrophil emigration into alveolar airspace and, 241
Hydrostatic edema, 213–15
11β-Hydroxysteroid dehydrogenase
aldosterone and, 121–25
Hyperaldosteronism
hypokalemia-induced metabolic alkalosis and, 334
Hyperglycemia
intestinal glucose transport and, 599
Hyperoxia
pleural effusion and, 217
Hypersomatotropism, 305, 309–10
Hypertension
aldosterone and, 117
cardiac hypertrophy and, 55
licorice ingestion and, 122
pulmonary
atrial natriuretic factor and, 104
syndrome of apparent mineralocorticoid excess and, 122
Hyperventilation
exercise and, 562–63
Hypokalemia
licorice ingestion and, 122
Hypopituitarism
kidney and, 309

I

Immediate early genes, 56–58
circadian clock and, 744–46
in heart, 58–59, 87–88
induction of, 57
regulation in mammals, 742–44
suprachiasmatic nucleus and, 746–48
Immunocytochemistry
cystic fibrosis transmembrane conductance regulator gene mRNA and, 620
renal intercalated cells and, 268
sodium/glucose cotransporter and, 578
Immunoglobulin gene
CANNTG sites and, 79
Increased permeability edema
pleural effusion and, 215–20
Indomethacin
renal vascular resistance and, 254
Information processing
synchrony in, 349–68
Infrared spectroscopy
gramicidin channel and, 483–86
Inhalation therapy technology, 194
Inhibins, 307
Inositol-1,4,5-trisphosphate
calcium oscillations and, 433–40
intracellular calcium stores and, 669
Insect flight muscle
power output of, 534
Insects
day-active
daily rhythms of, 28
In situ hybridization
cystic fibrosis transmembrane conductance regulator gene mRNA and, 620
endothelin and, 250–51
Insulin-like growth factor binding proteins, 135–39
synthesis of
regulation of, 139–43
Insulin-like growth factor-I
acute renal failure and, 312
chronic renal failure and, 312
compensatory renal hypertrophy and, 310–11
diabetes mellitus and, 311
glomerulosclerosis and, 313
gluconeogenesis and, 309
metanephrogenesis and, 314
renal tissue and, 306
Insulin-like growth factor-I receptor, 143–45

developmental regulation of, 144–45
function of, 143–44
hybrids, 144
Insulin-like growth factor-II
metanephrogenesis and, 314
renal tissue and, 306
Wilms' tumor and, 315
Insulin-like growth factor-II receptor, 145–46
signal transduction and, 145–46
Insulin-like growth factors, 131–46
autocrine/paracrine actions of, 132–34
bioavailability of regulation of, 137–38
biological actions of
in vitro, 131–34
in vivo, 134–35
cardiac hypertrophy and, 66
fetal development and, 142–43
growth and differentiation and, 131–32
modulation at cellular level, 138–39
synthesis of regulation of, 139–43
Insulinoma cells
calcium fingerprint in, 431
Integrin adherence proteins
neutrophil marginated pool and, 232–35
Integrins
neutrophil-endothelial cell interactions and, 241–42
neutrophil margination in lung and, 242
Interleukin-1
neutrophil adherence to endothelium and, 242
Intermodal integration
binding by synchrony and, 355
Interstitial compliance, 167–70
alveolar wall, 168–69
perivascular, 167–68
Interstitial fluid pressure, 160–65
alveolar wall, 161–62
measurement of, 161
reference pressure for, 161
Interstitial fluid resistance, 166–67
Interstitial liquid
pleural and pulmonary, 209–23
Interstitial pressure
gradients in, 170–73
Intestinal brush border membrane
cholera toxin and, 636
congenital defect in, 645–48
salt absorption across, 633
Intestinal electrolyte transport
congenital defects of, 641–48
Intestinal fluid secretion, 631–33
Intestinal ion transport
disorders of, 631–49
Intestinal sodium/glucose cotransporter, 575–87
cell biology and, 584
comparative studies of, 582–83
glucose-galactose malabsorption and, 585–86
kinetics of, 579–82
structure and function of, 577–78
sugar absorption and, 584–85
Intestinal sodium/glucose cotransporter gene, 585
Intestine
cystic fibrosis and, 609, 620
Escherichia coli enterotoxin receptor in, 639
glucose transporters in, 598–602
Ion channels
cardiac
regulation of, 465–66
in hair cells, 68–69
regulation of
caged calciums and, 771
stretch-activated
cardiac hypertrophy and, 65–66
Ion exchange
in renal intercalated cells, 270–71
Ionic permeability
cardiac action potential and, 4–6
Ion transport
along crypt-villus axis, 631–33
in collecting duct
renal H-K-ATPase and, 328–33
H-K-ATPase-mediated luminal sodium/potassium concentration and, 338–40
regulation of, 337
intestinal
disorders of, 631–49
Isoproterenol
renal intercalated cells and, 273–74
synaptic enhancement and, 381

J

Jones, J. H., 547–64
Josephson, R. K., 527–42
Jurkat cells
calcium oscillations in, 439
Juxtacrine stimulation, 307

K

Kandel, E. R., 397–418
Katsuwonus pelamis red muscle
capillarity of, 514–16
Kidney
brush border membrane Na+-H+ exchanger of
regulation of, 289–300
cystic fibrosis and, 620
endothelin action in sites of, 252–54
endothelin peptides in, 249–50
Escherichia coli enterotoxin receptor in, 639
glucose transporter in, 598, 602–3
glucose transporter-1 mRNA in, 594
growth of
growth factors and, 305–15
hemodynamics of
endothelin and, 254–56
insulin-like growth factor-I and, 135
intercalated cells of, 267–81
potassium conservation by, 324–28
sodium/glucose cotransporter in, 579
vascular tone in
endothelin and, 254–55
Kidney disease
endothelin and, 258–59
Kidney failure
growth factors and, 312–13
Kindling, 402–4
Kinesin
microvillus inclusion disease and, 647
Knowlton, K. U., 77–91

Komuro, I., 55–70
Kornhauser, J. M., 729–49
Koumenis, C., 729–49

L

Lactate dehydrogenase
  anaerobic power and, 554
Lai-Fook, S. J., 155–74
Laser Doppler velocimetry
  gramicidin channel and, 486–87
Late response genes, 56
Learning
  associative
    in *Aplysia*, 406–8
    in *Hermissenda*, 408–9
  motor
    synapse formation and, 400–1
  passive avoidance
    in chick, 404–5
  synchrony in, 349–68
Leucine zipper, 56–57
Leukocyte adhesion-deficiency disease, 234
Leukocytes
  in pulmonary circulation, 243–45
Licorice ingestion
  mineralocorticoid excess and, 122
Lidocaine
  cholera toxin secretory effect and, 638
Light
  protein synthesis in *Aplysia* and, 740–41
Light microscopy, 785–810
  modes of, 786–96
Limulus photoreceptor
  calcium oscillations in, 436
Lindstedt, S. L., 547–64
Linear mass-spring system
  equations describing, 671–72
Lipid metabolism
  circadian clock mutants and, 705–6
Lipocortins
  functions of, 741–42
Lipofection, 200–1
Liposomes
  cell transfection and, 190–92
  as gene transfer agents, 195–97
Listeria monocytogenes
  photoactivation of fluorescence and, 765
Liver
  cystic fibrosis and, 620
  Escherichia coli enterotoxin receptor in, 639
Local anesthesia
  gramicidin-containing bilayers and, 489
Locomotion
  oscillatory networks controlling, 667
Locomotor activity
  circadian rhythm of, 34, 45
Locomotor performance
  determinants of, 551–54
  efficiency during, 553
  maximum running speed in, 547–48
    vs. endurance, 548–51
  metabolic power and, 553–54
  neuromuscular coordination and, 551
  skeletal muscle mechanics/energetics and, 551–52
Long-term enhancement, 376–77
  AMPA/NMDA receptor-mediated responses and, 382–83
  expression of, 379–91
  mechanism of, 377–78
    postsynaptic, 383–85
  new connection formation and, 385–86
  quantal analysis and, 388–91
  retrograde messengers and, 386–88
  synaptic release of neurotransmitter and, 379–81
Long-term memory
  synapse formation during, 398–410
Long-term potentiation, 376
  in dentate gyrus, 402, 403
  diazo-4 and, 773
  in hippocampus, 401–4
Luciferase gene
  advantages/disadvantages of, 187
  expression assay for, 108–9
Lung
  alveolar flooding in
    mechanisms of, 157–58
  circulating pool of neutrophils in, 227
  cystic fibrosis and, 609, 620
  edema formation in
    sequence of, 156–57
  intercompartmental relationships in, 156–60
  interstitial compartments in, 156
  interstitial compliance in, 167–70
  interstitial fluid resistance in, 166–67
  interstitial pressure in, 160–65
  interstitial pressure gradients in, 170–73
  mammalian
    comparative morphology of, 199–201
  neutrophil-endothelial cell interactions in, 229–35
  neutrophil-mediated endothelial cell injury in
    adherence proteins and, 239–42
    cytokines and, 242–43
    requirements for, 235–38
  perivascular liquid cuffs in
    growth of, 158–60
Lung cells
  gene transfer to
    requirements for, 185–93
Lung cell transfection, 181–201
  cell-specific promoter elements and, 199
  DNA topology and, 197
  gene transfer vectors for, 198
Lung inflation
  extravascular lung water and, 173
Lung interstitium
  flow of liquid to pleural space from, 213–20
Lung liquid balance
  lung inflation and, 173–74
Lung liquid distribution, 155–74
Lung water
  extravascular
    vertical gradients in, 172–73
Lymphoid cell lines
  immunoglobulin gene expression in
    CANNTG sites and, 79
Lysozyme
  caged, 766–67

M

Macromolecular synthesis
  circadian oscillations and, 737–42

Macrophages
neutrophil adherence/emigration in lung and, 241–42
in pulmonary circulation, 243–44
Malaria, 22
Maltase
carbohydrate digestion and, 575
Mammals
circadian rhythm mutation in, 699–701
immediate early gene regulation in, 742–44
photic entrainment in, 742–44
Manganese superoxide dismutase
oxidant injury to cultured cells and, 183
Mannose-6-phosphate receptor
insulin-like growth factor-II receptor and, 145
Mannose transport
glucose transporter-2 and, 596
Margination
neutrophil, 228–29
effect of, 230–32
Mathieu-Costello, O., 503–23
Maximal performance
limits to, 547–64
McNaughton, B. L., 375–91
Mechanical stress
cardiac gene expression and, 55–70
cardiac gene regulation by, 56–62
mechanisms of, 62–67
Mechanical ventilation
lung fluid balance and, 173
Meconium ileus
cystic fibrosis and, 633
Meiosis
banana
circadian timing of, 22, 29, 32
Membrane potential
calcium oscillations in, 427–28
Memory
long-term
synapse formation during, 398–410
structural changes in, 397–418
stabilization and maintenance of, 413–16
time course of, 410–11
Menaker, M., 657–69
Mercuric chloride
glucose transport and, 592–93
Metabolic acidosis
H-K-ATPase activity and, 336
renal intercalated cells and, 275–77
Metabolic alkalosis
congenital chloridorrhea and, 643
H-K-ATPase activity and, 336
hypokalemia-induced hyperaldosteronism and, 334
Metabolic power
locomotor performance and, 553–54
Metanephrogenesis
growth factors and, 314
Methoxyphenacyl
caged compounds and, 759
Methylammonium
gramicidin channel and, 473
18-Methyloxidase
aldosterone synthesis and, 119
Microinjection
cell transfection and, 189–90
Microspectrofluorometry, 790
Microtomography, 794, 802
Microtubules
photoactivation of fluorescence and, 763–64
Microvillus inclusion disease, 645–48
Miller, S. B., 305–15
Miller-Hance, W., 77–91
Mineralocorticoid excess
syndrome of apparent, 121–24
Mineralocorticoid receptor, 120–21
cloning and expression of, 115–16
Mineralocorticoid response element, 117
Mitochondria
circadian clock mutants and, 706
Mitochondrial oxidative capacity
aerobic performance and, 557–58
Mitosis
caged calciums and, 771
Mitotic spindle
photoactivation of fluorescence and, 763–64
Molecular cloning
endothelin receptors and, 253
Monensin
c-fos gene expression and, 66
Monocytes
in pulmonary circulation, 243–44
Morphometry
muscle capillarity and, 504–5
Moth
circadian pacemaker of, 47
Motion processing
area specialized for, 357–58
Motor cortex
response synchronization in, 360
Motor learning
synapse formation and, 400–1
Mouse
circadian phase maps for, 29–31
Mouse mammary tumor virus
promoter and enhancer sequences of
fusion gene construction and, 185
Mucosal mast cells
calcium oscillations in, 430
Mucous glands
cystic fibrosis and, 199–200
Mullerian-inhibiting substance, 307
Multimode image processing, 802–5
Multimode microscopy
live cell experiments and, 799–802
new modes for, 809
performance improvements in, 808–9
serum stimulation and, 807–8
wound healing and, 805–7
Multimode microscopy workstation, 795–96
design considerations for, 796–99
Muscle capillarity, 503–23
in bat flight muscle, 512–14
in hummingbird flight muscle, 510–12
oxygen delivery and, 507
oxygen demand and, 508
in rat/bat limb muscle, 516–18
in rat heart, 519–20

structural assessment of, 504–7
in tuna red muscle, 514–16
Muscle cells
calcium-storing organelle in, 440–41
insulin-like growth factor binding proteins in, 132
Muscle contraction
calcium control in caged calciums and, 771
dynamics of, 527–34
isotonic power during, 530–34
Muscle creatine kinase gene expression in cardiac cells, 79
Muscle force
shortening velocity and, 527–30
Muscle power
sustainable theoretical analysis of, 539–42
work loop analysis of, 534–39
Muscle relaxation
diazo-2 and, 773
Mus musculus
circadian program of, 31
Mutagenesis
cystic fibrosis transmembrane conductance regulator and, 615
Mutation
circadian rhythmicity and, 698–720
gramicidin channel and, 475–77
Mutational analysis, 683–84
Myocardial cell hypertrophy
myosin heavy chain gene and, 88–89
Myocardial tumors
in transgenic mice, 106–8
Myocardium
plasticity of, 55
rat capillarity of, 519–20
Myocytes
cardiac cystic fibrosis and, 620
ventricular catecholamine-activated current in, 463
Myofibrils
maximum power available from, 540
muscle fiber occupied by, 541
Myogenic determination genes, 79
Myogenin gene expression
insulin-like growth factor-I and, 132
Myosin
microvillus inclusion disease and, 647
Myosin-II
wound healing and, 806–7
Myosin heavy chain
isoforms of alternative pre-mRNA splicing and, 60
Myosin heavy chain gene
myocardial cell hypertrophy and, 88–89
Myosin light chain
isoforms of alternative pre-mRNA splicing and, 60

N

Natural selection, 19, 28
Navigation
circadian clocks and, 665
Nederlof, M. A., 785–810
Negative feedback
biological oscillators and, 664
calcium oscillators and, 669
Negentropy, 19
Neocortex
assembly coding in, 354
cortical networks in simulations of, 353
distributed processing in, 353–55
synaptic transmission in homosynaptic potentiation of, 366
synchrony in, 349–68
temporal coding in, 354–55
Nephromegaly
acromegaly and, 309
Nernst-Planck continuum theory
gramicidin channel and, 491
Nerve growth factor
metanephrogenesis and, 314
renal tissue and, 308
Nervous system
enteric cholera toxin and, 637–39
Neuroendocrine function
transgene expression and, 101
Neuromuscular coordination
locomotor performance and, 551
Neuromuscular junction
long-term synaptic plasticity at, 409–10
Neuronal circuit oscillator, 667–68
differential equations for, 675–78
qualitative scheme for, 668
Neurospora
circadian clock in *frq* mutation and, 710–12
molecular biology of, 707–10
circadian clock genes in, 685
circadian clock mutants in, 685–98, 701–5
circadian rhythms of temperature compensation and, 28
gene transcription in clock-controlled, 51
Neurotensin
cholera toxin and, 638
Neurotransmitter agonists
postsynaptic responsiveness to, 381–82
Neurotransmitters
caged, 760–62
cardiac pacemaker control and, 462–65
c-fos gene expression and, 57
cholera toxin and, 638–39
release at synapses caged calciums and, 771
synaptic release of long-term enhancement and, 379–81
Neurotrophin-3, 308
Neutrophil depletion
studies of, 238–39
Neutrophils
activation of, 228–29
cytochemical/morphological changes due to, 235–36
adherent cross-sectional area of, 237–38
superoxide anion release from, 234
in alveolar microvessels, 235
calcium oscillations in, 430
circulating pool of, 227–28
emigration of, 228–29
endothelial cell injury and, 235–43
endothelial cell interactions in lung, 229–35

histological appearance of, 233
marginated, 228–29
adherence proteins and, 232–35
effect of, 230–32
pool in lung, 229–30
pulmonary endothelial cells and, 232
migration of
calcium oscillations and, 446–47
sequestration of, 228–29
Nicardipine
c-fos gene expression and, 63
Nicotinic acetylcholine receptor
Bis-Q and, 760–61
carbamoylcholine and, 761
Nifedipine
c-fos gene expression and, 63
Nitric oxide
long-term enhancement and, 386–88
NMDA receptor-dependent release of, 386
norepinephrine release and, 381
Nitric oxide synthase
long-term enhancement and, 386–87
L-Nitroarginine
long-term enhancement and, 387–88
2-Nitrobenzyl caging groups, 756–58
3-Nitrophenyl ester
caged compounds and, 759
1-(2-Nitrophenyl)ethyl
2-nitrobenzyl groups and, 756
Nitroprusside
long-term enhancement and, 387
2-Nitrosobenzaldehyde
2-nitrobenzyl groups and, 756
NMDA receptor
glutamate-induced depolarization and, 381
long-term enhancement and, 382–83
Nordihydroguaiateric acid
long-term enhancement and, 386
Norepinephrine
endothelin potency compared, 255
synaptic enhancement and, 381
Normal modes analysis
gramicidin channel and, 483–86
Northern blot analysis
cystic fibrosis transmembrane conductance regulator gene mRNA and, 620
endothelin receptor and, 253
sodium/glucose cotransporter and, 582
Nuclear clock genes, 690–95
Nuclear magnetic resonance
gramicidin channel and, 479–83
Nutrition
insulin-like growth factors and, 140–42

O

O'Brien, T. X., 77–91
Ocular dominance columns
synaptic rearrangement establishing, 398–99
Omeprazole
renal H-K-ATPase and, 327, 341
Oncogenesis
transgenic mice and, 105–8
Oocytes
calcium gradients in, 444
sodium/glucose cotransporter expression in, 580
Optical traps, 795
Optic tectum
response synchronization in, 356, 360
Oral rehydration therapy
acute diarrhea and, 576
Organogenesis, 77
insulin-like growth factor-I receptor mRNA and, 145
Oscillations
biological
cycle period of, 662–63
mathematical descriptions of, 670–79
phase relationships of, 663
waveform of, 663–64
calcium
in non-excitable cells, 427–47
circadian, 729–49
macromolecular synthesis and, 737–42
as consequence of synchrony, 362–63
epiphenomena and, 360–63
origin of, 352–53
as prerequisite for synchrony, 361–62
role in synaptic plasticity, 365–67
in single-unit recordings, 363–67
synchrony and, 350–52
Oscillators
biological, 661–79
nonlinear differential equations for, 672–79
physical oscillators compared, 671
qualitative descriptions of, 664–70
qualitative model for, 664
calcium, 668–70
qualitative scheme for, 670
circadian, 665–67
in *Aplysia* eye, 732–37
components of, 730–32
protein components of, 739–40
qualitative scheme for, 666
neuronal circuit, 667–68
qualitative scheme for, 668
O'Shea, M., 305–15
Osmoregulation
cyclic AMP and, 67–68
in *Escherichia coli*, 68
Osteoblasts
insulin-like growth factor-II activity in, 139
insulin-like growth factor-II synthesis in, 133
Osteosarcoma cells
mitogenesis in
insulin-like growth factor-I and, 139
Ostrinia
diapause induction in
photoperiod response curve for, 42
Ouabain
c-fos gene expression and, 66
ion exchange in renal intercalated cells and, 271
renal H-K-ATPase and, 327–28, 338
Oxidative phosphorylation
aerobic power and, 554
metabolic power and, 554
mitochondrial, 557
Oxycarbonyl linkers
caged compounds and, 760

Oxygen delivery
muscle capillarity and, 507
Oxygen demand
muscle capillarity and, 508
skeletal muscle and, 509–16

P

Palytoxin, 9
Pancreas
cystic fibrosis and, 609, 620, 633
Pancreatic acinar cells
calcium gradients in, 444
calcium oscillations in, 430, 435–37
calcium spiking behavior in, 429
Pancreatic β-cells
calcium oscillations in, 427–28
Pancreatic exocrine cells
chymotrypsin gene in CANNTG sites and, 79
Pane, D., 785–810
Pane, J., 785–810
Paramecium
circadian rhythms of temperature compensation and, 27
Parasites
filarial
innate daily program of, 28
Parathyroid hormone
insulin-like growth factors and, 133
ion exchange in proximal tubule and, 292–93
Parotid acinar cells
calcium influx in, 443
calcium oscillations in, 430, 438
Parotid gland
cystic fibrosis and, 620
Passerine birds
circannual rhythms in, 30
migratory activity of
timing of, 29
Passive avoidance learning
in chick, 404–5
Patek, D. R., 785–810
pCO2
renal H-K-ATPase and, 337
Peptic ulcer
carbenoxolone for, 122
Peptide aggregation
gramicidin channel and, 489
Peptides
caged, 765–67
Peribronchial interstitial pressure, 165
Peripheral diffusion
aerobic performance and, 559
Periplaneta
locomotory activity in circadian rhythm of, 45
Peritoneal mast cells
exocytosis in
calcium and, 446
Perivascular interstitial compliance, 167–68
Perivascular interstitial filling time constant for, 170
Perivascular interstitial pressure, 166–67
Perivascular liquid cuffs
growth of, 158–60
Pertussis toxin
c-fos gene expression and, 63
pH
renal H-K-ATPase and, 337
Phase
biological oscillations and, 663
Phase contrast microscopy, 789
Phenotypic variation
heritability of, 684
Phenylalkylamine
endothelin-induced renal vasoconstriction and, 255
Phloretin
glucose transport and, 592
Phlorizin
sugar transport and, 582
Phorbol esters
protein kinase C activation and, 63
Phorbol myristate acetate
neutrophil emigration into alveolar airspace and, 241
Phosphate transport
proximal tubular
insulin-like growth factor-I and, 309
Phospholipase A2
cardiac ion channels and, 465
lipocortins and, 741
Phospholipase C
c-fos gene expression and, 63–64
protein synthesis and, 64–65
Phosphoprotein pp175
insulin-like growth factor-I receptor and, 144
Phosphoprotein pp185
insulin-like growth factor-I receptor and, 143–44
Phosphorylation
calcium oscillations and, 446
cystic fibrosis transmembrane conductance regulator and, 616
oxidative
aerobic power and, 554
metabolic power and, 554
mitochondrial, 557
renal brush border membrane exchanger and, 292–98
sodium/glucose cotransporter and, 578
Photic entrainment
in *Aplysia* eye, 733–34
in mammals, 742–44
Photoactivation, 765–67, 794
Photoactivation of fluorescence, 762–65, 776
Photolysis
caged compounds and, 755
gramicidin channel and, 488–89
Photoperiodic induction
circadian rhythmicity and, 40–45
Photoperiodic response
origin of, 50
Photoreceptor cells
associative training and, 408
calcium oscillations in, 436
Photoregulation
reversible, 765
Photorelease
spatial control of, 776–77
Photosynthesis
temporal programming of, 28–29
Physical oscillators
biological oscillators compared, 671
Phytochrome
photoperiodic response and, 41
Pittendrigh, C. S., 17–52
Pituitary gonadotropes
calcium oscillations in, 428
Plants
circadian rhythm mutation in, 698–99
growth patterns of
environmental mechanical stimuli and, 69
Platelet activating factor
cell surface receptor for
gene encoding, 184

Platelet-derived growth factor
glomerulonephritis and, 313–14
insulin-like growth factor-I and, 132
renal tissue and, 308
Wilms' tumor and, 315
Platelets
calcium oscillations in, 430
Pleural effusion
hydrostatic edema and, 213–15
increased permeability edema and, 215–20
pleural/pulmonary liquid and, 221–22
Pleural liquid
pleural effusion and, 221–22
protein concentration of, 210
pulmonary edema and, 212–21
pulmonary liquid and, 209–12
Pleural space
flow of liquid to
from alveolar space, 220–21
conditions allowing, 212–13
from lung interstitium, 213–20
Polymerase chain reaction
preproET-1 transcripts and, 252
POP-1
timing mechanism in *Aplysia* eye and, 741–42
Post-tetanic potentiation, 376
decay rate of
temperature transition in, 390
Potassium
aldosterone synthesis and, 118–19
cardiac action potential and, 7
conservation by kidney, 324–28
Potassium current
cardiac pacemaker and, 456–58
Potassium intake
renal H-K-ATPase and, 334–35
Potassium restriction, 324
H-K-ATPase-mediated ion transport and, 338–40
Procaine amide
sodium availability curve and, 6–7
Proenkephalin gene
transcription of
activation of, 57
Progesterone
mineralocorticoid receptor and, 124–25
Propranolol
c-fos gene expression and, 63
Prostacyclin
shear stress and, 68
Prostaglandin E2
cholera toxin and, 639
Prostaglandins
endothelin-induced renal vasoconstriction and, 254–55
Protein kinase
calcium-phospholipid-dependent
renal brush border membrane exchanger and, 295–97
cyclic AMP-dependent
renal brush border membrane exchanger and, 292–95
Protein kinase A
cystic fibrosis transmembrane conductance regulator and, 616
renal intercalated cells and, 274
Protein kinase C
c-fos gene expression and, 63–64
c-fos induction and, 57
cystic fibrosis transmembrane conductance regulator and, 616
diacylglycerol and, 433
endothelin-induced smooth muscle contraction and, 255
protein synthesis and, 64–65
Protein kinase II
calcium-calmodulin-dependent
renal brush border membrane exchanger and, 297–98
Pseudohypoaldosteronism, 118
Pulmonary capillary membrane
fluid filtration across, 155
Pulmonary circulation
adherence glycoproteins in, 241
leukocytes in, 243–45
neutrophils in, 230–32
Pulmonary edema
formation of
sequence of, 156–57
hydrostatic, 213–15
increased permeability, 215–20
pleural/pulmonary liquid and, 212–21
Pulmonary endothelial cell injury
neutrophil-mediated
adherence proteins and, 239–42
cytokines and, 242–43
requirements for, 235–38
Pulmonary endothelial cells
neutrophil margination and, 232
Pulmonary gas exchange
aerobic performance and, 561–62
Pulmonary hypertension
atrial natriuretic factor and, 104
Pulmonary liquid
pleural effusion and, 221–22
pleural liquid and, 209–12
pulmonary edema and, 212–21
Pulmonary microvessels
neutrophil margination in, 229–30
Pulmonary ventilation
aerobic performance and, 562–63
Purkinje fibers
β-adrenergic stimulation in, 464
pacemaker depolarization in, 457
Pyranose absorption, 575
Pyruvate kinase
anaerobic power and, 554

Q

Quantal analysis
long-term enhancement and, 388–91
Quinidine
sodium availability curve and, 6–7

R

Radiolysis
gramicidin channel and, 488–89
Raman spectroscopy
gramicidin channel and, 485

Rat
myocardium of
capillarity of, 519–20
Ratio imaging, 809
Rat limb muscle
capillarity of, 516–18
Recall
associative
long-term enhancement and, 377–78
Receptor-mediated endocytosis
cholera toxin and, 637
Reciprocal inhibition
neuronal circuit oscillators and, 667
Recombinant DNA
transgenic technology and, 97–98
Reflection interference microscopy, 795, 800, 806
REM sleep
ponto-geniculo-occipital waves generated with, 350
Renal blood flow
endothelin and, 249
Renal brush border membrane Na^+-H^+ exchanger
calcium-calmodulin-dependent protein kinase II and, 297–98
calcium-phospholipid-dependent protein kinase and, 295–97
cyclic AMP-dependent protein kinase and, 292–95
regulation of, 289–300
Renal failure
growth factors and, 312–13
Renal growth
growth factors and, 305–15
Renal hemodynamics
endothelin and, 254–56
Renal H-K-ATPase, 323–42
acid-base balance and, 335–36
aldosterone and, 336
gastric H-K-ATPase and, 341–42
immunoreactivity of, 333–34
ion transport and, 337–40
ion transport in collecting duct and, 328–33
pCO2 and pH and, 337
physiological significance of, 340–41
potassium intake and, 334–35
regulation of, 334–40
Renal intercalated cells, 267–81
chloride channels in, 271
ion exchangers in, 270–71
plasticity of, 279–81
regulation of
aldosterone and, 277–78
β-adrenergic agonists and, 273–74
systemic acid-base perturbations and, 274–77
subtypes of, 267–72
axial distribution of, 272–73
vacuolar H^+ ATPase of, 269–70
Renal metabolism
regulation by growth factors, 309
Renal pathophysiology
endothelin and, 258–59
Renal proximal tubule cells
brush border membrane Na^+-H^+ exchanger in, 298–300
Renal transport
regulation by growth factors, 309
Renal vascular tone
endothelin and, 254–55
Renal vasoconstriction
endothelin-induced mechanisms of, 255–56
Renin-angiotensin system
precursor genes for heart and, 67
Renin mRNA
in heart, 67
Renotropin, 309
Reproductive system
cystic fibrosis and, 609–10
Resonance energy transfer ratio, 800
Resorufin
caged, 764–65
Respiratory acidosis
renal intercalated cells and, 275–77
Respiratory system
maximum flux of oxygen through, 557
Response synchronization
feature dependence of, 356–57
outside visual cortex, 360
substrate for, 358
Retinal pacemaker system, 666
Retinohypothalamic tract
photic entrainment and, 742
Retroviral transfection
transgenic technology and, 98
Retroviruses
cell transfection and, 192–93
viral promoters of
fusion gene expression and, 185
Reversible photoregulation, 765
Riordan, J. R., 609–25
Roach
circadian clock of, 45
Rous sarcoma virus
promoter and enhancer sequences of
fusion gene construction and, 185
Ryan, K. W., 785–810
Ryanodine
calcium storage and, 441–42

S

Saccadic eye movements
ponto-geniculo-occipital waves generated with, 350
Saintpaulia
growth of
light cycles and, 32
photoperiodic induction in, 42
Salivary gland
epidermal growth factor and, 306
Salt absorption
intestinal brush border membrane and, 633
sodium/glucose cotransporter and, 576
Salt appetite
aldosterone and, 117
Salt retention
syndrome of apparent mineralocorticoid excess and, 122
SAP-1, 57
Sarafotoxin
endothelin and, 250
Sarcomere
proteins of, 60
Sarcoplasmic reticulum
calcium release from, 436–37
calcium storage in, 440–41
Saturnid
circadian pacemaker of, 47
Scanning electron microscopy
renal intercalated cells and, 268

Scanning tunneling microscopy
gramicidin channel and, 487
SCH28080
renal H-K-ATPase and, 327–28, 339, 341
Schuster, V. L., 267–81
Second messengers
c-fos induction and, 57
lipocortins and, 742
protein synthesis in *Aplysia* and, 740–41
serotonin entrainment pathway and, 735
Secretory cells
calcium oscillations in, 427–28
Secretory leukocyte protease inhibitor promotor
in vitro transfection and, 183
Selaphorus rufus flight muscle
capillarity of, 510–12
E-Selectin
expression on endothelial cells, 245
L-Selectin
expression on lymphocyte surfaces, 244–45
neutrophil margination in lung and, 234
Selectins
neutrophil margination in lung and, 242
Selection
natural, 19, 28
Semrad, C. E., 631–49
Sensitization, 406–7
long-term
structural changes in, 410
Sequestration
neutrophil, 228–29
Serine proteases
acylation of, 765–66
Serotonin
cell adhesion molecule modulation and, 412
cholera toxin and, 638
protein synthesis in *Aplysia* and, 740–41
Serotonin entrainment pathway
in *Aplysia* eye, 734–35
Serum
insulin-like growth factor binding protein-1 in, 139
Serum response element
c-fos induction and, 57
Serum response factor, 57
Serum stimulation
multimode microscopy and, 807–8
Shear stress
endothelin secretion and, 251
gene expression and, 68
Shenolikar, S., 289–300
Signal transduction
associative memory and, 408–9
insulin-like growth factor-II receptor and, 145–46
Signal transmission
role of synchrony in, 364–65
Simonson, M. S., 249–59
Singer, W., 349–68
Sinoatrial node
electrical activity of
parasympathetic modulation of, 464–65
sympathetic modulation of, 462–64
pacemaker cells of
slow diastolic polarization and, 455–56
Site-directed mutagenesis
gramicidin channel and, 475
Skeletal α actin gene expression
in cardiac cells, 79
Skeletal muscle, 527–42
contraction dynamics of, 527–34
force generation in
cell permeabilization and, 774
force-velocity characteristics of, 531–32
glucose transporter in, 597–98
mechanics/energetics of locomotor performance and, 551–52
oxidative capacity of, 558
oxygen demand of, 509–16
sodium hypothesis for, 3
Skeletal myogenesis
muscle gene regulation during, 79
Sleep
REM
ponto-geniculo-occipital waves generated with, 350
slow-wave
delta-range oscillations in, 351
Sleep/wakefulness
circadian rhythm of, 665
Slow diastolic depolarization, 455–56
Slow-wave sleep
delta-range oscillations in, 351
Small intestine
sugar absorption in, 576
Smooth muscle cells
incorporation of caged compounds into, 774–75
Sodium
aldosterone synthesis and, 118–19
tubular transport of
endothelin and, 249
Sodium balance
endothelin and, 257–58
Sodium/glucose cotransporter, 575–87
cell biology and, 584
comparative studies of, 582–83
glucose-galactose malabsorption and, 585–86
kinetics of, 579–82
structure and function of, 577–78
sugar absorption and, 584–85
Sodium/glucose cotransporter gene, 585
Sodium-hydrogen exchange transport protein, 290
Sodium hypothesis, 3
Sodium restriction
H-K-ATPase-mediated ion transport and, 338–40
Solar orientation
circadian clocks and, 665
Solute transport
in renal intercalated cells, 271–72
Somatosensory cortex
response synchronization in, 360
Somatotopic maps
modification of, 401
Soybean
photoperiod induction in, 41
Standing wave microscopy, 809
Staphylococcal α-toxin
incorporation of caged compounds into cells and, 774–75
Starling
sun-compass behavior of, 24–25, 32
Starling equation, 155
Steady-state fluorescence anisotropy, 792, 801–2

Steroid metabolism
syndrome of apparent mineralocorticoid excess and, 123–24
Stilbene
ion exchange in renal intercalated cells and, 270
Streptococcus pneumoniae
neutrophil emigration into alveolar airspace and, 241
Streptomycin
c-fos gene expression and, 63, 66
Subtractive hybridization
immediate early genes and, 747–48
Sucrase
carbohydrate digestion and, 575
Sugar absorption
enterocytes and, 576, 584
regulation of, 584–85
sodium/glucose cotransporter and, 582
Sun-compass behavior, 24–25, 32
Suprachiasmatic nucleus
immediate early genes and, 746–48
photic entrainment and, 742–44
Surfactant deficiency
alveolar liquid pressure and, 173
Surfactant protein-A gene expression, 183
Surfactant protein-C gene expression
in alveolar type II cells, 183
SV 40
promoter and enhancer sequences of
fusion gene construction and, 185
SV 40 T antigen gene
eukaryotic promoter-driven fusion gene expression and, 186
Sweat gland
cystic fibrosis and, 610–12, 620
Sylvia atricapilla
circannual rhythms in, 30
Sylvia borin
circannual rhythms in, 30
Symmorphosis
aerobic performance and, 563–64
Synapses
formation during long-term memory, 398–410
hippocampal
long-term enhancement of, 375–91
Synapsins
phosphorylation of
neurotransmitter release and, 381
Synaptic enhancement, 375–91
AMPA/NMDA receptor-mediated responses and, 382–83
expression of, 379–91
mechanism of, 377–78
postsynaptic, 383–85
new connection formation and, 385–86
quantal analysis and, 388–91
release of neurotransmitter and, 379–81
retrograde messengers and, 386–88
Synaptic growth
learning-related molecular mechanisms of, 411–16
Synaptic plasticity
long-term
at neuromuscular junction, 409–10
role of oscillations in, 365–67
role of synchrony in, 364–65
Synaptic reorganization
cell adhesion molecules and, 411–13
Synaptogenesis
reactive
new connection formation in, 385–86
Synchronization
between areas, 357–58
experimental search for, 355–60
response
feature dependence of, 356–57
outside visual cortex, 360
substrate for, 358
transcallosal, 362
Synchrony, 349–68
epiphenomena and, 360–63
oscillations and, 350–52
oscillations as consequence of, 362–63
oscillations as prerequisite for, 361–62
in signal transmission, 364–65
in synaptic plasticity, 364–65

T

Takahashi, J. S., 729–49
Taylor, D. L., 785–810
Temperature
circadian rhythmicity and, 25–27
long-term enhancement and, 389–91
Temporal coding, 354–55
cross-correlation analysis and, 355
Temporal organization, 17–52
Terazosin
c-fos gene expression and, 63
Testis
Escherichia coli enterotoxin receptor in, 639
Tetanus toxin
internalization of, 637
Tetrodotoxin
c-fos gene expression and, 63
cholera toxin secretory effect and, 638
Thalamic neurons
oscillatory activity in, 358
Thapsigargin
calcium oscillations and, 437–38
Theophylline
intestinal chloride secretion and, 633
microvillus inclusion disease and, 646
Thin-layer chromatography
gramicidin channel and, 479
Thorens, B., 591–604
Thrombin
acylation of, 765–66
endothelin secretion and, 251
Tissue plasminogen activator
activity-dependent synaptic plasticity and, 416
shear stress and, 68
T lymphocytes
calcium conductance in, 443
calcium oscillations in, 430
TM6-NBF super family, 612
Total internal reflection fluorescence, 793

Trachea
Escherichia coli enterotoxin receptor in, 639
Transcallosal synchronization, 362
Transforming growth factor-α
metanephrogenesis and, 314
renal tissue and, 306–7
Transforming growth factor-β
endothelin secretion and, 251
glomerulonephritis and, 313
immediate early genes and, 59
metanephrogenesis and, 314
renal tissue and, 307–8
Transgenic mice
AP-1 expression in, 746–47
cardiovascular function alteration with, 101–5
cardiovascular research and, 97–110
cell line generation with, 105–8
elevated plasma atrial natriuretic factor in, 103–5
insulin-like growth factor-I gene expression in, 134–35
myocardial tumors in, 106–8
Transgenic models
design of, 99–101
Transgenic technology
applications of, 108–9
development of, 97–99
Transmission electron microscopy
renal intercalated cells and, 268
Transpulmonary pressure
vertical gradient in, 171–72
Tropomyosin
isoforms of
alternative pre-mRNA splicing and, 60
Troponin complex
isoforms of
alternative pre-mRNA splicing and, 60
Trypsin
acylation of, 765
Tsien, R. Y., 755–78
Tubulin
caged, 764
Tumor necrosis factor
endothelin secretion and, 251
neutrophil adherence to endothelium and, 242–43
Tumors
insulin-like growth factors and, 133–34
Tuna red muscle
capillarity of, 514–16
Two-photon absorption laser scanning fluorescence microscopy, 809

U

Ultraviolet light
gramicidin channel and, 488–89
Undernutrition
insulin-like growth factors and, 140–41
Upstroke velocity
propagating action potential and, 6–7
Uteroglobin promoter
in vitro transfection and, 183
Uterus
insulin-like growth factor-I production in, 133

V

Vagal stimulation
heart rate and, 464
Vanadate
renal H-K-ATPase and, 327
van-Bilsen, M., 77–91
Vascular cell adhesion molecule-1, 244
Vascular endothelium
endothelin secretion and, 251
Vasoactive intestinal polypeptide
cholera toxin and, 638
Vasoconstriction
endothelin-induced mechanisms of, 255–56
Vasopressin
calcium spiking behavior and, 428–29
Vector sequences
transgenic technology and, 99
Ventricular myocytes
catecholamine-activated current in, 463
Veratridine
c-fos gene expression and, 66
Very late antigen-4, 244
Vibrio cholerae enterotoxin, 635–39
Video-enhanced differential interference contrast, 799–800
Villin
microvillus inclusion disease and, 647
Vinculin
wound healing and, 806–7
Viruses
cell transfection and, 192–93
Visual cortex
local response synchronization in, 356
synapse formation in, 398–99
Visual system
binding problem and, 353
Voltage clamping
cardiac action potential and, 6–7

W

Warbler
circannual rhythms in, 30
Water absorption
sodium/glucose cotransporter and, 576
Water balance
endothelin and, 258
Weidmann, S., 1–11
Weinman, E. J., 289–300
Western blot analysis
human erythrocyte glucose transporter and, 592
sodium/glucose cotransporter and, 578, 582
Western ligand blotting
insulin-like growth factor binding proteins and, 135
Wheat
gene transcription in clock-controlled, 51
Wiener-Kronish, J. P., 209–23
Wilms' tumor
growth factors and, 314–15
Wingo, C. S., 323–42
Work loop analysis
muscle power and, 534–39
Wound healing
multimode microscopy and, 805–7

platelet-derived growth factor and, 308
Wright, E. M., 575–87

X

Xenopus oocytes
glucose transporter in, 596–97
Xerophytes
photosynthetic process in temporal programming of, 28
X-ray crystallography
gramicidin channel and, 483
X-ray diffraction
gramicidin channel and, 480, 486

Y

Yazaki, Y., 55–70
Yohimbine
c-fos gene expression and, 63

Z

Zhu, H., 77–91
Zona occludens toxin, 635